Code: 9A05301 **1**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to Computer Science & Systems Engg, Information Technology and Computer Science & Engg)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Explain the law of duality.
(b) Explain the terms of equivalence.

2 Show that r ^ (p v q) is a valid conclusion
Form premises p v q , q → r , p → m and ~m.

3 (a) Let A = {1, 2, 3, 4, 5, 6, 7}. Determine a relation R on A by aRb 3 divides (a - b), show that R is an equivalence relation. Also determine the partition generated by R.
(b) Let A = { 1,2,3,4 } and let R = {(1,1) , (1,2), (2,1), (2,2), (3,4), (4,3), (3,3), (4,4)} be an equivalence relation on R . Determine A/R.

4 (a) G is a group and there exist two relatively prime positive integers m and n such that $a^m b^m = b^m a^m$ and $a^n b^n = b^n a^n$ for all a,b, ϵ G prove that G is abelian.
(b) Find the order of every element in the multiplicative group G = { $a,a^2,a^3,a^4,a^5,a^6 = e$}

5 Find the coefficient of X^{16} in $(1+X^4+X^8)^{10}$

6 (a) In how many ways can a committee of 5 teachers and 4 students be chosen from 9 teachers and 15 students?
(b) There are 25 true or false questions on an examination. How many different ways can a student do the examination if he or she can also choose to leave the answer blank?

7 (a) Prove that a graph is connected if and only if it has spanning tree?
(b) Define spanning tree?

8 (a) Define isomorphism problem?
(b) Prove that two graphs are isomorphic iff their corresponding adjacency matrices are equal?

*****

Code: 9A05301 **2**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to Computer Science & Systems Engg, Information Technology and Computer Science & Engg)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Show that the truth value of the formula ((P → Q) ^ (Q → R))→ (P → R) are independent of their propositional variables.
(b) Give the converse and contra positive of the proposition P → (Q ^ R).

2 (a) Show that R → s can be derived from the Premises (P → (Q → S)), ~ R v P and Q .
(b) Explain the predicates with suitable examples.

3 (a) What is a relation? Explain the properties of relations?
(b) What are the operations on relations?

4 (a) Let (S, *) be a semi group and a, b ϵ S. If a*b = b and b*a = a. show that a, b, a*b and b*a are idempotent.
(b) Prove that the identity element of a sub-group is the same as that of the group.

5 (a) Find a generating function for the number of r-combinations of {3.a,5.b,2.c}
(b) Solve the recurrence relation using generating function. a_n-$9a_{n-1}$+$20a_{n-2}$=0, for n≥2 and a_0= -3 and a_1= -10

6 (a) How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8 and 9 if no repetitions are allowed?
(b) How many 8 digit numbers can be formed by arranging the digits 1,1,1,1, 2, 3, 3, 3, 3?

7 Explain different graph traversals with an example?

8 (a) Explain Konigsberg problem in graph theory?
(b) Explain Chinese Postman Problem in graph theory?
(c) Describe Euler walk?

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Code: 9A05301 **3**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to Computer Science & Systems Engg, Information Technology and Computer Science & Engg)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Explain conditional proposition with a suitable example.
(b) What is logical equivalence? Explain with an example.
(c) Explain about derived connectives using truth tables.

2 (a) Verify the proposition (p ^ q) and (p v q) is a contradiction.
(b) Symbolize the following statements
(i) X is the father of the mother of y. (ii) All rational numbers are real numbers.

3 (a) What is a compatibility relation? Explain the procedure to find the maximal compatibility blocks.
(b) What is a partial order relation?

4 (a) Explain about Homomorphism?
(b) Prove that "Let θ: G→G' be a homomorphism. Then θ is one – one ⇔ K = ker θ = {e}

5 (a) In how many ways can a person climb up a flight of n steps if the person can skip at most one step at a time?
(b) Solve the recurrence relation $a_n-7a_{n-1}+12a_{n-2}=3^n$, for n>=2

6 (a) How many ways can we get a sum of 8 when two indistinguishable dice are rolled?
(b) What is the coefficient of x^3y^7 in $(x+y)^{10}$?

7 (a) Prove that $K_{3,3}$ is non-planar?
(b) Construct the spanning tree of K_3 using the traversal algorithm that needs backtracking?

8 (a) Show that every simple graph has two vertices of the same degree?
(b) Prove that a complete graph with n vertices contains n (n - 1)/2 edges?

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Code: 9A05301 **4**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to Computer Science & Systems Engg, Information Technology and Computer Science & Engg)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Define tautology, contradiction, contingency with examples.
(b) What are statements? How are they denoted?

2 With reference to automatic theorem proving. Show that S v R is a tautologically implied by (p v q) ^ (p → r) ^ (q → s).

3 (a) What is a function? State the types of functions.
(b) What is an inverse function? Explain with an example.
(c) If b : A → B and g : B → C are bijective functions then $(g \circ f)^{-1} = f^{-1}og^{-1}$

4 (a) Prove that the group $< Z_4, +>$ is cyclic find all its generators?
(b) Prove that "Every cyclic is abelian, but the converse is not true".

5 (a) Solve the recurrence relation $a_n^2 - 2a_{n-1}^2 = 1$ for $n \geq 1$ and $a_0 = 2$.
(b) Describe the compound interest problem using recurrence relation?

6 In how many ways can we draw a heart or a spade from an ordinary deck of playing cards? A heart or an ace? An ace or a king? A card numbered 2 through 10? A numbered card or a king?

7 (a) For any simple graph G, prove that the number of edges of G is less than or equal to n(n-1)/2, where n is the number of vertices in a graph.?
(b) Define spanning tree and planar graph?

8 (a) Show that any graph with 4 or fewer vertices in planar?
(b) Show that $K_{3,2}$ is planar?

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Code: 9A05302

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ADVNACED DATA STRUCTURES
(Common to ECC, CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

1

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Explain the loop structures available in C++.
(b) Write a program to print prime numbers between two limits.

2 (a) Explain in detail about operator overloading.
(b) Write a note on virtual base classes with examples.

3 (a) Define data structure. List out various types of data structures.
(b) Describe in detail the array implementation of queues.

4 Short notes on
(a) Hash function.
(b) Separate chaining.
(c) Double hashing.

5 (a) Differentiate between internal and external sorting.
(b) Explain any one external sorting method with suitable example.

6 Write a C++ program to implement AVL tree and its operations.

7 Explain the operations: insertion, deletion and searching in B-tree. Also write the procedure to find height of B-tree.

8 Analyze the running time of Boyer – Moore algorithm.

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Code: 9A05302

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ADVNACED DATA STRUCTURES
(Common to ECC, CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

2

Answer any FIVE questions
All questions carry equal marks
*****

1 Compare and contrast between splay tree and B-tree.

2 What are Tries? Explain the following:
(a) Standard Tries.
(b) Compressed Tries.
(c) Suffix Tries.

3 Write a C++ program to perform 2D matrix operations as follows:
(a) Define class MATRIX, use appropriate constructor.
(b) Define methods for the following two matrix operations: determinant and transpose.
(c) Write a main program to demonstrate the use of the MATRIX class and its methods.

4 (a) What is Dynamism? Explain any three kinds of dynamism for object-oriented design with an example for each.
(b) What is Compile time polymorphism? Explain with an example.

5 (a) Differentiate between the terms linear and non linear data structures.
(b) Explain the working of stacks and queues taking suitable examples.

6 (a) Explain how a hashing table can be represented?
(b) Describe any two hashing functions with example.

7 (a) Define ascending and descending heap. Trace heap sort algorithm for 20, 33, 12, 22, 11, 34, 56, 30, 40.
(b) Explain any one external sorting method with example.

8 List the situations in which single rotations can be performed in an AVL tree. Explain them with suitable example.

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Code: 9A05302

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ADVNACED DATA STRUCTURES
(Common to ECC, CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

3

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) What are constructors and destructors? Explain how they differ from normal functions? Illustrate with an example.
(b) How does a structure in C and C++ differ? Explain with example.

2 (a) What is Containership? How does it differ from Inheritance?
(b) Write a function template for finding the minimum value contained in an array.

3 (a) Explain the linked list implementation of stack and write the procedures for its operations.
(b) Describe big 'O' notation used in algorithms.

4 (a) Explain the functionality of linear and quadratic probing with respect to hashing technique.
(b) The following values are to be stored in a hash table
25, 42, 96, 101, 102, 162, 197, 201
Use division method of hashing with a table size of 11. Use sequential method of resolving collision. Give the contents of array.

5 (a) Discuss how deletions are carried out in priority queue.
(b) Write notes on external sorting.

6 (a) What is binary search tree? Construct the binary search tree for the following data
21, 6, 9, 4, 17, 24, 12, 10, 35, 31, 30, 13. What is the advantage of BST over a binary tree?
(b) Write notes on balanced trees.

7 (a) Explain about Red-black trees with example.
(b) Write a C++ program to implement Red-black tree operations.

8 Analyze the time complexity of Knuth-Morris-Pratt algorithm.

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Code: 9A05302

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ADVNACED DATA STRUCTURES
(Common to ECC, CSS, IT, & CSE)

Time: 3 hours Max Marks: 70 **4**

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) What are the keywords used in C++ for exception handling? Describe their usage with suitable example.
(b) Write short notes on object pointers.

2 (a) Explain the concept of template class by writing a C++ program for linear search with template.
(b) Explain different type conversions in C++ with suitable examples.

3 (a) Explain the big Oh notation.
(b) Compare recursion with iteration. Give example.

4 (a) Explain about the basics of Hashing technique.
(b) Differentiate between open hashing and closed hashing.

5 Explain in detail about priority queues and external sorting.

6 Write notes on AVL trees.

7 Explain the following basic splay tree operations:
(a) Insertion.
(b) Deletion.
(c) Searching.

8 Explain the following pattern matching algorithms:
(a) Brute force algorithm.
(b) Knuth-Morris-Pratt algorithm.

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Code: 9A12301 **1**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DIGITAL LOGIC DESIGN & COMPUTER ORGANIZATION
(Common to Computer Science & Systems Engineering, and Information Technology)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Explain the operation of a computer.
(b) Convert the following numbers with the indicated bases to decimal: (4310)5, (198)12, (16.5)16, (26.24)8.

2 Design a Modulo-12 up Synchronous counter Using T-Flip Flops and draw the Circuit diagram?

3 Explain about the two ways to achieve a BCD Counter using a Counter with Parallel Load?

4 Show the hardware to be used for the addition and subtraction of two decimal numbers in Signed-magnitude representation. Indicate how an overflow is detected.

5 (a) Explain with the help of an example, how data is accessed from memory location
(b) Write an ALP program that can evaluate the expression AXB+CXD in a single accumulator Processor

6 (a) Explain about the organization of the control unit which allow conditional branching in micro program with a neat diagram.
(b) Explain, how microinstruction is executed in micro programmed control with examples?

7 (a) List the specifications of floppy disks and magnetic disks
(b) What is meant by disc access time? What is meant by SCSI bus?

8 (a) How are interrupts enabled and disabled?
(b) How are multiple interrupts handled?
(c) How are vector interrupts implemented in processors?

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Code: 9A12301 **2**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DIGITAL LOGIC DESIGN & COMPUTER ORGANIZATION
(Common to Computer Science & Systems Engineering, and Information Technology)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) With the help of diagram, explain about interrupt cycle execution.
(b) Explain about IA-32 architecture supported addressing modes with examples.

2 (a) Explain, how a complete instruction is executed with the help of example.
(b) Explain about the control sequence for an unconditional branch instruction.

3 (a) Explain the characteristics of some common memory technologies.
(b) List the key characteristics of memory system and explain in brief.

4 (a) Write in detail the procedure to explain how processor's software checks each of the I/O devices.
(b) Draw and explain the block diagram of I/O interface.

5 (a) Write short notes on
(i) Error detecting codes, (ii) Error correcting codes.
(b) Give the detailed procedure to detect and correct a single error in a message.

6 Using K-map determine the minimal expression for the following function with MAXTERMS and MINTERMS $F = \sum m (0, 2, 3, 4, 6, 7, 8, 12, 14, 15, 16, 18, 19, 20, 22, 23, 24, 28)$.

7 Explain about the Following
(a) Serial Transfer in 4-bit shift Registers.
(b) Binary Ripple Counter.

8 (a) Draw the block diagram of BCD adder and explain in detail.
(b) A mode control input determines whether the digit is complemented or not. What is the advantage of using this code over BCD?

*****

Code: 9A12301 **3**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DIGITAL LOGIC DESIGN & COMPUTER ORGANIZATION
(Common to Computer Science & Systems Engineering, and Information Technology)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 Convert the following numbers:
(a) 10101100111.0101 to Base 10.
(b) (153.513)10 = ( )8.
(c) Find (3250 - 72532)10 using 10's complement.
(d) Given that (292)10 = (1204)b determine `b'.

2 (a) Convert the following SOP equation into its POS form. G = $XY^1Z + X^1YZ^1$.
(b) Reduce the following Boolean expressions to three literals. $A^1C^1 + ABC + AC$.

3 (a) What is a decoder? Draw the circuit of 3-to-8 line decoder with the help of a truth table.
(b) Describe the working of a 4-bit shift left register with a timing diagram.

4 Derive an algorithm in flow chart form for adding and subtracting two fixed- point binary numbers when negative numbers are in signed-1's complement representation.

5 (a) What do you mean by memory capacity?
(b) Explain various addressing modes with the help of examples.

6 (a) Discuss on the single bus organization of the processor unit.
(b) Define Micro instruction.

7 (a) Discuss the Internal structure of 64X1 DRAM with help of a sketch.
(b) Explain the Timing diagram of the READ and WRITE cycle of Dynamic RAM.

8 (a) Explain with the help of neat sketch the single bus structure and multiple bus structure to connect I/O devices to a computer.
(b) Explain the different types of signal transfers that take place during CPU communication.

*****

Code: 9A12301 **4**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DIGITAL LOGIC DESIGN & COMPUTER ORGANIZATION
(Common to Computer Science & Systems Engineering, and Information Technology)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Briefly explain about Big-endian and Little-endian Assignments.
(b) Explain, how loop instructions are executed in computer?

2 (a) Explain with the help of a neat sketch how the data transfer between the registers and common bus takes place.
(b) Draw the figure of the implementation of one bit register and explain.

3 (a) Draw and explain the organizations of ROM and PROM.
(b) Explain the difference between EPROM and EEPROM .

4 (a) Discuss the various I/O interfacing techniques.
(b) Discuss the programmed I/O.

5 (a) What are Self complementing codes? Give examples.
(b) Write the procedure for constructing Hamming codes. Construct hamming codes for the decimal numbers 1,4, 8.

6 (a) Differentiate Latch and flip-flop. Explain the construction of S-R Latch.
(b) Construct a D-Latch and explain its operation.

7 Implement the following functions using PAL and PLA
$F1 = \Sigma m(2,3,4,7,8,11)$, $F2 = \Sigma m(1,3,5,7,9,11,13,15)$.

8 Explain with the help of neat block diagram high performance addition and multiplication operation.

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Code: 9A12302 **1**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DATA COMMUNICATION SYSTEMS
(Information Technology)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Draw the black diagram of a data communication network and explain its working.
(b) Explain serial and parallel data transmission.

2 (a) What is the difference between bit rate and based rate? Explain with an example.
(b) Briefly discuss various analog modulation systems.

3 (a) What are the advantages and disadvantages of optical Fiber cables?
(b) Draw the block diagram of optical Fiber communication system and explain the function of each block.

4 (a) Define companding. Briefly explain the process of digital companding.
(b) Describe Frequency – Division multiplexing.

5 (a) Explain the Terrestrial propagation of electromagnetic waves.
(b) Briefly explain basic telephone call procedure.

6 (a) Explain the concept cell splitting and sectoring in cellular telephone system.
(b) Write short notes on personal communication system.

7 (a) What are the two general categories of error control? What is the difference between them?
(b) Define character synchronization. Describe the asynchronous data format.

8 Write short notes on any two of the following
(a) Voice – Band data communication modems.
(b) Asynchronous voice – band modems.
(c) Probability of error and bit error rate.

*****

Code: 9A12302 **2**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DATA COMMUNICATION SYSTEMS
(Information Technology)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) What is data communication? Draw a block diagram of data communication system and explain its components.
(b) Define the four transmission modes for data communication circuits and also explain the differences between two – wire and four – wire circuits.

2 (a) Define the following terms with suitable examples.
(i) Signal – to – Noise ratio. (ii) Electrical Noise and information capacity.
(b) Explain digital modulation system with the help of block diagram and waveforms.

3 (a) Draw the block diagram of optical fiber communication system and explain the function of each block.
(b) Explain the propagation of light through an optical fiber cable.

4 (a) Define dynamic range. Contrast linear and nonlinear PCM codes.
(b) What is frame synchronization? How is it achieved in a PCM/TDM system?

5 (a) Explain the optical properties of Radio waves.
(b) Briefly explain satellite communication system.

6 (a) Write short notes on paging systems.
(b) Explain the concepts cell splitting roaming and handoff.

7 (a) Explain the different types of character codes used in data communication systems.
(b) Define character synchronization. Describe the synchronous data format.

8 Write short notes on any two of the following
(a) Digital service unit and channel service unit.
(b) Synchronous voice – Band modems.
(c) Probability of error and bit error rate.

*****

Code: 9A12302 **3**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DATA COMMUNICATION SYSTEMS
(Information Technology)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Draw the block diagram of a data communication system and explain its working.
(b) State the need for layering the communication protocol. Explain the function of various layers of OSI model.

2 (a) Why do we need modulation? Would it be right to simply send the information as the signal itself?
(b) What is the difference between bit rate and band rate? Explain with an example.

3 (a) What are the advantages and disadvantages of optical fiber cables?
(b) Draw the block diagram of optical fiber communication system and explain the function of each block.

4 (a) Draw the block diagram of pulse code modulation system and explain the function of each block.
(b) Describe the Bell system T1 digital carrier system.

5 (a) Describe wavelength – Division multiplexing.
(b) Explain the optical properties of Radio waves.

6 (a) Write short note on cordless telephones.
(b) Explain the cellular telephone concepts, cell splitting and segmentation.

7 (a) Explain about digital cellular telephone system.
(b) Explain the Bar codes used in data communication sytems.

8 Write short notes on any two of the following
(a) Voice – Band data communication modems.
(b) Synchronous Voice – Band modems.
(c) Probability of Error and Bit Error Rate.

*****

Code: 9A12302 **4**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
DATA COMMUNICATION SYSTEMS
(Information Technology)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) What is data communication? Draw a block diagram of data communication system and explain its components.
(b) Explain serial and parallel data transmission.

2 (a) Explain Digital modulation system with the help of block diagram and waveforms.
(b) Derive the expression for signal to noise ratio in PCM system.

3 (a) Draw the block diagram of optical fiber communication system and explain the function of each block.
(b) Mention the losses occur in optical fiber cables and explain briefly.

4 (a) What are the advantages and disadvantages of digital transmission?
(b) Describe time – division multiplexing.

5 (a) Explain Terrestrial propagation of electromagnetic waves.
(b) Briefly explain the microwave communication systems.

6 (a) Briefly explain the following telephone instruments
(i) Cordless telephones. (ii) Electronic telephones.
(b) Explain the cellular telephone concepts cell splitting, segmentation and handoff.

7 (a) Compare second generation cellular telephone system with first generation analog cellular telephone system.
(b) What are the two general categories of error control? What is the difference between them?

8 Write short notes on any two of the following
(a) Digital and channel service units.
(b) Asynchronous Voice – Band modems.
(c) Probability of Error and Bit Error Rate.

*****

Code: 9A02306

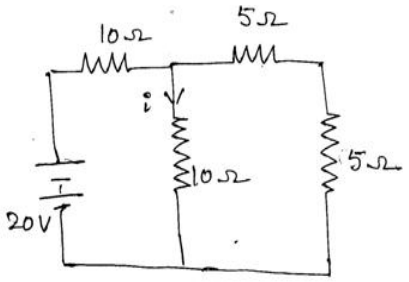
1

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
BASIC ELECTRICAL ENGINEERING
(Common to CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

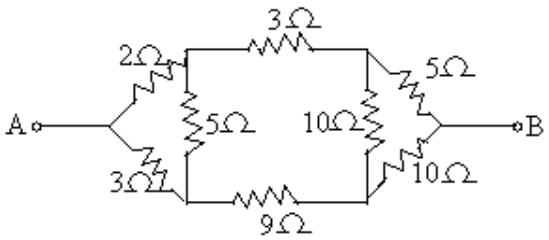
Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Find the current, i in the following Figure.



(b) Define and Explain Ohm's law.

2 (a)



Find the equivalent resistance between the terminals A and B of network shown in figure.

(b) State and explain superposition theorem.

3 Consider a general A.C circuit in which the current leads the applied voltage by an angle φ . Write the equation for the voltage and current and hence derive the equation for the power. Also plot the voltage, current and power wave forms.

4 (a) Explain the principle of operation of a single – phase transformer when it supplies lagging power factor load.

(b) Derive the emf equation of a single phase transformer and draw the no load phasor diagram

5 (a) Explain the operating principle of a DC generator in detail.

(b) A 4 – pole wave connected DC generator having 60 slots on its armature with 6 conductors per slot, runs at 750 rpm and generates an open circuit voltage of 230 V. Find the useful flux per pole.

6 The armature of a 4 –pole, lap connected DC shunt motor takes 200 A at speed of 500 rpm. The flux per pole 50 mWb. The number of armature turns is 500. The torque lost in windage, friction and iron losses can be assumed as 2.5 %. Calculate (i) The torque developed by the armature (ii) The shaft torque (iii) Shaft power in kW.

7 (a) Explain how the rotating magnetic field is developed in a 3-ø induction motor?

(b) A 6 pole, 3-ø induction motor runs at 960 rpm on full load when supplied from a 50Hz supply. Determine the synchronous speed and slip at full load.

8 With neat diagrams, explain the types of moving iron instruments with their working principles.

*****

Code: 9A02306

2

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
BASIC ELECTRICAL ENGINEERING
(Common to CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 Explain the construction and working of Permanent Magnet Moving Coil instrument with neat diagram

2 A 3-phase, 8 pole, 60 Hz induction motor has a star-connected wound rotor. The rotor emf between slip rings at standstill is 50V.The rotor resistance and standstill reactances are 0.4Ω and 2Ω respectively. Find

(i) Rotor currents per phase at starting and slip rings short circuited
(ii) Rotor currents per phase at starting if a star connected rheostat of 5 Ω per phase is connected across the slip rings
(iii) Rotor emf when the motor is running at full load at 850 rpm.
(iv)Rotor current at full load and rotor power factor at full load

3 The armature of a 6 –pole, 6 circuit DC shunt motor takes 300 A at speed of 400 rpm. The flux per pole 75 mWb. The number of armature turns is 500. The torque lost in windage, friction and iron losses can be assumed as 2.5 %. Calculate (i) The torque developed by the armature (ii) The shaft torque (iii) Shaft power in kW.

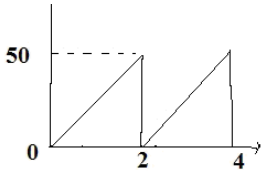
4 (a) Explain the type of series generator with neat circuit diagram.

(b) The armature of a 2 – pole, 220 V Lap wound generator has 400 conductors and runs at 300 rpm. Calculate the useful flux / pole if the number of turns in each field coil is 1200.

5 (a) Define and explain basic circuit elements.
(b) Define and explain KCL & KVL with neat diagram.

6 Derive the expression for the following
(a) Three resistors are connected in parallel; (b) Three inductors are connected in parallel
(c) Three capacitors are connected in parallel.

7 Determine the rms value and average value of the saw tooth waveform shown in figure. Calculate the form factor.



8 What is an ideal transformer and derive an expression for induced emf in a single phase transformer. Also explain its constructional details with neat diagram.

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Code: 9A02306

3

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
BASIC ELECTRICAL ENGINEERING
(Common to CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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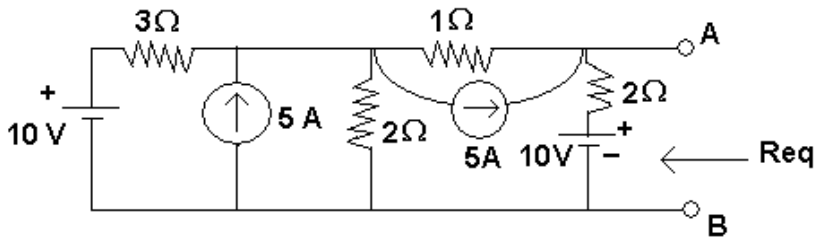
1 A 500 -KVA, 3-phase 50 Hgs Transformer has a voltage Ratio (line voltages) of 33/11 KV and is Delta/Star connected. The resistances per phase are: High voltage 35 V, low voltage 876 V and the Iron loss is 3050 W. Calculate the efficiency at full load and one-half of full load respectively (a) at unity PF (b) 0.8 PF.

2 (a) Define and explain Kirchhoff's laws.
(b) Define and explain resistance, inductance and capacitance.

3 (a) State Thevenin's theorem.
(b) Find equivalent resistance as seen into terminals A and B in given Figure.



4 (a) A series R-L-C circuit consists of 100 ohms resistor and an inductor of 0.318 Henry and a capacitor of unknown value. This circuit is supplied by 230V, 50 HZ supply and draws a current of 2.3 ohms, and the current is in phase with the supply voltage. Find i) the value of the capacitance, and the power supplied by the source.
(b) Explain about 'j' operator

5 A DC shunt generator supplies a load of 75 kW at 440 V through feeders of resistance 0.135 ohm. The resistance of armature and shunt field windings is 0.045 and 150 ohms respectively. Calculate (i) Terminal voltage (ii) Shunt field current and (iii) Generated emf.

6 A 20 kW, 250 V dc shunt generator has armature and field resistances of 0.04 ohm and 200 ohm respectively. Determine the total armature power developed when working.
(i) As generator delivering 20 kW output and
(ii) As a motor taking 20 kW input.

7 A 3-ø 6 pole 50Hz cage motor is running with a slip of 4%.
Find (a) Speed of rotating field relative to stator winding; (b) Motor speed
(c) slip speed; (d) Frequency of the emf induced in the rotor;
(e) Speed of rotation of rotor mmf relative to rotor winding;
(f) Speed of rotor of rotor mmf relative to stator winding.

8 Explain the moving iron repulsion type instrument with a neat diagram.

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Code: 9A02306

4

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
BASIC ELECTRICAL ENGINEERING
(Common to CSS, IT, & CSE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Derive the equation for equivalent resistance when connected in (i) series (ii) parallel.
(b) Three resistors R_1,R_2 & R_3 are connected in series with a constant voltage source of 'V' volts. The voltage across R_1 is 4V, power loss in R_2 is 16W and the value of R_3 is 6 ohms. If the current flowing through the circuit is 2A, find the voltage 'V'.

2 (a) What is meant by EMF of a source?
(b) Distinguish between ideal and practical voltage source? Give examples?
(c) Distinguish between ideal and practical current sources? Give example?
(d) The internal resistance of a 12v − battery is a0.9 ohms. What will be its terminal voltage when the current drawn from the battery is 2 Amps

3 (a) Explain what do you understand by
(i) unidirectional current. (ii) alternating current. (iii) sinusoidal a.c. Current.
(b) Define the terms (i) R.M.S value. (ii) time period. (iii) frequency. (iv) average value.
(c) Find out average value and root mean square value of output waveform of full wave rectifier circuit. Assume the waveform has maximum voltage of 24V with 100Hz frequency.

4 Discuss the constructional details of single - phase transformer and hence obtain the expression for induced emf of a transformer.

5 A 440 V DC shunt motor draws a current of 250 A. The armature resistance is 0.02 ohm and shunt field resistance 50 ohm. Find the back emf. If the lap wound armature has 120 slots with 4 conductors per slot, at what speed will the motor run when the flux per pole is 0.04 Wb?

6 (a) What are the differences between a dc shunt motor and a dc series motor?
(b) The armature of a 6 – pole, 6 circuit dc shunt motor takes a current of 400 A at a speed of 350 rpm. The flux / pole is $80x10^{-3}$ Wb. The number of armature conductors is 1200 and it may be assumed that 3% of the torque is lost in windage, friction and iron losses. Calculate the brake horse power developed.

7 In the case of an 8-pole induction motor the supply frequency was 50Hz and the shaft speed was 735 rpm. What were the magnitudes of the following
(i)synchronous speed. (ii)slip speed. (iii)per unit slip. (iv)percentage slip.

8 Explain the types of damping devices used in the measuring instruments in detail with neat diagrams.

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Code: 9A04301

1

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ELECTRONIC DEVICES AND CIRCUITS
(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE & MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) With a neat diagram explain the working of an open circuited PN junction. Give necessary response curves.
(b) The current flowing in a germanium PN junction diode at room temperature in $9x10^{-7}$A, when the large reverse voltage is applied. Calculate the current flowing when 0.1V forward bias is applied.

2 (a) With a neat circuit diagram and necessary wave forms explain the operators of PN junction diode half wave rectifier.
(b) An ac supply of 220V is applied to a half wave rectifier circuit through a transformer with a turns ratio of 10:1. Find (i) dc output voltage. (ii) PIV. Assume the diode to an ideal one.

3 (a) Draw the circuit of a BJT in CB configuration and explain its input and output characteristics with neat curves.
(b) An NPN transistor with α=0.9 is connected in CB configuration and gives a reverse saturation current I_{co}=15μA. Calculate the base and collector currents for an emitter current of 4mA.

4 (a) Draw the fixed bias circuit a transistor and derive the relevant expressions/ equations for fixed dias.
(b) A fixed dias circuit with V_{CC}=10V, a resistor R_C=2kΩ is connected between V_{CC}(+) and collector, Rb=100kΩ is connected between base and collector. Find I_B, I_C and V_{CE} with β=100. Transistor is made of silicon.

5 (a) With a neat construction diagram explain the principle of operation of a JFET. Give its characteristics.
(b) An n-channel JFET has I_{DSS}=10mA and V_P=-2V. Determine the drain source resistance 'r_{DS}' for (i) V_{GS}=0V. (ii) V_{GS}=-0.5V.

6 (a) Explain and give the expression for self bias arrangement of a FET with a neat circuit diagram.
(b) A FET amplifier in the common source configuration uses a load resistance of 250kΩ and the transconductance is 0.5mA/V. What is the voltage gain of the amplifier? Given r_d=200kΩ.

7 (a) For an emitter follower circuit determine A_I, A_V ,R_I, and R_O.
(b) For the emitter follower with R_S=0.5kΩ and R_L=5kΩ, calculate A_I, R_i, A_{VS} and R_o. Assume h_{fe}=50, h_{ie}=1kΩ, h_{oe}=25μA/V.

8 Write short notes on the following
(a) Varacter diode.
(b) Uni junction transistor.

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Code: 9A04301

2

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ELECTRONIC DEVICES AND CIRCUITS
(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE, & MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Explain the working of a PN junction diode in both forward and reverse bias conditions along with characteristics.
(b) A diode reaches its maximum power rating of 2.5 watts when operating in the forward bias at the forward voltage of 900mv. Calculate
(i) The maximum allowable forward current I_f (max).
(ii) The forward diode resistance R_f.

2 (a) Explain the working of a full wave rectifier with a neat circuit diagram and with relevant wave forms.
(b) A full wave single phase rectifier employer a π-section filter consisting of two 4μF capacitors and one 20H choke. The load current is 50 μA. Calculate the DC output voltage and the ripple voltage. The resistance of the choke is 200Ω.

3 (a) Explain the operation of a BJT in CE configuration. Give its input – output characteristics. Define β.
(b) What is the value of α for a BJT that has a β of 90? Find the base and the emitter current if the collector current is 4mA.

4 (a) Give the analysis of a voltage – divider bias derive the necessary equations.
(b) In a transformer coupled amplifier stage, V_{CC}=12 V, R_C=4.3 KΩ V_{BE}=0.7 V and β=50. the quiescent voltage V_{CE} is 4V. Determine
(i) R_E. (ii) The stability factor 'S'.

5 (a) Explain the working of a depletion type MOSFET with a neat construction diagram and its characteristics.
(b) An n-channel depletion type MOSFET has I_{DSS}=10mA and V_p=-2v. Determine the actual value of drain to source resistance r_{DS} when (i) V_{GS}=1V. (ii) V_{GS}=2V.

6 (a) With a neat circuit diagram explain the operation of a voltage divider bias arrangement of JFET with necessary equations.
(b) The Q-point of a JFET in a source self – bias arrangement is chosen at V_{GS}=-1.5V and I_{Dsat}=2mA. Find the value of the resistance R_S.

7 (a) For a BJT derive the expressions for the current gain (A_I), voltage gain (A_V), input resistance (R_i) and output resistance (R_O).
(b) Design an emitter follower having R_i=500kΩ, R_O=20Ω. Assume h_{fe}=50, h_{ie}=1kΩ, h_{oe}=25μA/v. Also find A_I and A_V for the emitter follower.

8 Write short notes on the following
(a) Schottky Barrier diode.
(b) Light dependent resistor.

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Code: 9A04301 **3**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ELECTRONIC DEVICES AND CIRCUITS
(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE, & MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Discuss about temperature dependence of the V-I characteristics of a PN junction diode.
(b) For a diode calculate (i) The maximum allowable forward current I_f(max).
(ii) The forward diode resistance R_f when the maximum power rating of diode is 3.0watts and forward bias voltage of 1200mv.

2 (a) Explain the working of a bridge rectifier with a neat circuit diagram and with relevant wave forms.
(b) Ideal diodes are used in a bridge rectifier with a source of 230V, 50Hz. If the load resistance is 150Ω and turns ratio of transformer is 1:4, find the dc output voltage and pulse frequency of the output.

3 (a) With a neat diagram explain how a transistor acts as an amplifier. Give the DC load line analysis of a BJT.
(b) For a transistor calculate (i) β and (ii) α if the base current is 20μA and the collector current is 5mA.

4 (a) Discuss about stabilization in a transistor against variations in I_{CO}, V_{BE} and β.
(b) In a voltage divider bias circuit, V_{CC}=20 V and R_C=1.5 kΩ, the Q point is V_{CE}=8V and I_C=4mA. Stability factor S=12 and β=50. Find R_1, R_2 and R_E.

5 (a) Explain the working of an enhancement type MOSFET with a neat construction diagram and its characteristics.
(b) An n-channel enhancement type MOSFET has k=25mA/v^2 and $V_\gamma = 2v$. Determine drain-source resistance γ_{DS} for (i) V_{GS}=4V; (ii) V_{GS}=6V; (iii) V_{GS}=10V.

6 (a) Give the comparison between JFET and BJT.
(b) For a constant drain – to –source voltage, if the gate – to – source voltage is changed from 0 to 2V. The corresponding change in the drain current becomes 2mA. Calculate transconductance of the FET if the ac drain resistance is 200 kΩ. Also calculate the amplification factor of the FET.

7 (a) For common base amplifier derive A_I, A_V, R_I and R_O.
(b) For the emitter follower with R_S=1 kΩ and R_L=2 kΩ. Calculate A_I, R_i, A_V, A_{VS} and R_O. Assume h_{fe}=50, h_{ie}=1 kΩ, h_{oe}=25 μA/V.

8 Write short notes on the following
(a) Thermistor.
(b) Right emitting diode.

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Code: 9A04301 **4**

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011
ELECTRONIC DEVICES AND CIRCUITS
(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE & MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
*****

1 (a) Discuss about working of a zener diode using its V-I characteristics.
(b) The current flowing in a silicon PN junction diode at room temperature is 10μA, when the large reverse voltage is applied. Calculate the current flowing when 0.2v forward bias is applied.

2 (a) With a neat circuit diagram explain the working principle of a Zener voltage regulator.
(b) For a Zener shunt regulator if v_z=10v, R_S=1kΩ, R_L=10kΩ and the input voltage varies from 25 to 40 V. Find the maximum and minimum values of Zener current.

3 (a) Define α and β. Derive the relationship between α and β of the transistor.
(b) For a PNP transistor α=0.98 connected in CB configuration and reverse saturation current is 10μA. Calculate the base and collector currents for an emitter current of 5mA.

4 (a) Bring out the differences between Emitter feedback bias and collector to emitter feedback bias.
(b) In a self bias circuit V_{CC}=10v, R_C=2.5kΩ and the Q point is V_{CE}=5v and I_C=2mA. A stability factor of 10 is desired and β=60. Calculate R_1, R_2 and R_E.

5 (a) Give the analysis of a JFET small signal model. Derive the necessary equations.
(b) Determine drain to source resistance γ_{ds} of an m-channel depletion type MOSFET having I_{DSS}=10mA and V_P=-2v for V_{GS} values of (i) 3v and (ii) 4.5v.

6 (a) With a neat circuit diagram explain about fixed bias arrangement of a JFET.
(b) Calculate the dynamic resistance of a JFET having an amplification factor of 80 and transconductance of 400 μmho.

7 (a) For a common emitter amplifier derive the expressions for A_I, A_V, R_I and R_O.
(b) For the emitter follower with R_S=0.75 kΩ and R_L=3 kΩ. Calculate A_I, R_I, $A_V A_{VS}$ and Ro. Assume h_{fe}=50, h_{ie}=1 kΩ, h_{oe}=25 μA/v.

8 Write short notes on the following
(a) Tunnel diode.
(b) Silicon controlled rectifier.

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